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THE PRESENT STATUS OF DUTCH ELM DISEASE CONTROL ACTIVITIES IN THE UNITED STATES

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Dutch elm disease control activities, as now organized, are an outgrowth of eradication and investigational work initiated in 1930, following discovery of the disease in Ohio during the summer of that year. In 1930, three diseased elm trees at Cleveland, and one tree in Cincinnati were confirmed as infested with Graphium ulmi. To supplement investigations conducted by the Ohio Agricultural Experiment Station, the Federal government made available a nominal appropriation of \$13,000 for work during the 1932 fiscal year. These investigations largely were confined to the State of Ohio until discovery in June 1933 of an extensive zone of infection in an area which subsequently has been determined as including territory roughly within a radius of 40 miles from New York Harbor. Including the infected trees discovered in 1930, 18 elms attacked by the Dutch elm disease have been found outside the main area of infection. Further finds in Cleveland include 4 diseased trees in 1931, 1 in 1933, and 2 in 1934. One infected tree was found in Baltimore, Md. in 1933. New isolated finds in 1934 comprise 1 diseased tree in Old Lyme, Conn., 4 infected trees in Indianapolis, Ind. and 1 confirmed tree in Norfolk, Virginia.

Definite information concerning the means by which the disease gained entry into this country was not available until July 1933. At that time a plant quarantine inspector at Baltimore observed elm burl logs from Europe which were determined as infected with Graphium ulmi. Infected logs also containing two

species of the carrier elm-bark beetles were later intercepted at New York City, Norfolk and New Orleans. Effective October 23, 1933, Notice of Quarantine No. 70 was issued restricting the entry into the United States of all parts of the elm. Since the restrictions requiring freedom from bark and immediate heat treatment of logs imported for veneer purposes did not entirely safeguard the country from further importations of the disease, an embargo against the entry of such logs is now in force.

Although supervision of the disease control work has been somewhat permanent since the work began, personnel at the disposal of Federal and State agencies for location and eradication of confirmed specimens has been from a variety of sources. In the absence of regularly appropriated funds with which to eradicate the disease in the heavily infested sections composing the tri-State area adjacent to New York City, funds and labor were sought from the several emergency units of both State and Federal governments. The work was financed as an ECW project from July 10 to August 21, 1933. PWA funds amounting to \$80,000 were employed from August 21, 1933 to December 15, 1933. The work then continued under an allotment of \$400,000 of CWA funds until May 31, 1934. Upon conclusion of CWA activities, the control project was taken over as a unit of the work Division of the FERA. In addition, some 20,000 man hours of labor were contributed between July 10, 1933 and July 1, 1934 by men of the CCC working under the supervision of foremen employed on PWA funds. A New Jersey appropriation of \$5,000 was available for the work during the fiscal year 1933. Not until the beginning of the present fiscal year were regularly appropriated funds available with which to engage in systematic scouting to the apparent boundaries of the zone of infection for the purpose of definitely locating diseased trees.

For the fiscal year beginning July 1, 1934 there was included in the

Department of Agriculture Appropriation Bill the sum of \$150,000 for Dutch elm disease control. This sum is reducible by the amount of any federal emergency funds allotted to the control work. State funds for cooperative control work were also available on approximately the same date in New York and New Jersey. The State of New York appropriated \$172,500 and the State of New Jersey \$30,000. Assistance in the work has been rendered by personnel of the Connecticut Agricultural Experiment Station.

Under cooperative agreements between the Bureau of Entomology and Plant Quarantine and the infected States, each organization has been assigned certain definite phases of the work. Scouting for the purpose of locating diseased trees, and the laboratory culture of collected specimens to confirm presence or absence of infection are designated as Federal activities. Information concerning confirmed specimens is turned over to the State control organization. State officials then make the necessary arrangements for eradication of the diseased trees, and finally arrange for or perform the felling and burning of these trees. In New Jersey and New York, tree removal and destruction largely have been performed under contracts let by the State control projects to commercial tree firms, municipal shade tree commissions, or other experienced organizations equipped to satisfactorily remove from residential areas large trees frequently requiring topping and sectional removal with ropes to avoid damage to wires and nearby buildings. A number of eradication crews were also employed on State funds. These arrangements worked satisfactorily until depleted funds in New Jersey interrupted the work in that State. Employment during July and August of this year of large numbers of scouts to survey the rapidly expanding area soon depleted Federal funds, forcing a reduction in personnel on August 31. In New Jersey contracts for diseased tree eradication rapidly exhausted the \$30,000 State appropriation, and the removal of diseased trees in New Jersey was halted on September 15. Federal field personnel

was reduced to a minimum when defoliation of elms in the fall made it impracticable to do further scouting for evidence of disease symptoms.

Considered at various stages of progress the record of survey and eradication accomplishments show that at the end of 1933, 571 Graphium trees had been removed and 248 additional infected trees were standing. Just prior to the present year's scouting 1487 diseased trees had been removed and 5 known cases were standing. This was the nearest approach to complete removal of confirmed trees recorded since work began in the tri-State area. By December 26, 1934, 6,329 infected trees had been destroyed. On that date there were still standing 1284 confirmed Graphium trees. Of these 1,279 were in New Jersey, 4 in New York and one in Connecticut. Thus, to date, in the continuously infected zone, 7,613 elm trees have been determined as attacked by the Dutch elm disease. A rather hurried census shows that there are approximately 3,000,000 elms in the total work area.

At the peak of the survey in August, 317 men were employed in covering assigned areas. In subdividing the portions of the states to be surveyed, convenient sections each containing from 20 to 35 square miles, dependent upon elm population were worked by a crew of two men. These usually consisted of a man experienced in tree work as a top scout to spot suspected infections and a climber to obtain sample twigs from portions showing disease symptoms. Trees showing these symptoms are accurately located and information recorded concerning them for use in the event the tree is confirmed as Graphium and removal is necessary.

Originally systematic scouting in this manner of all elm trees in the infected sections was planned. In the few instances practicable, experienced scouts made their observations from slowly moving automobiles. Most of the survey work has required coverage of the assigned work areas by scouts on foot. Originally it was

planned to make three surveys at monthly intervals of all elms in the infected areas plus a protective strip including territory 10 miles beyond the known infections. The first go-over was entirely completed. Discovery of Graphium infected trees just outside the zone showing more or less continuous infection caused considerable enlargement of the work area. This expansion of territory, together with forced reduction of the scouting personnel; permitted only partial completion of the second and third go-overs in the entire area. At the end of 1934, the total infected zone in the three states included 2,464 square miles. The additional 10-mile strip of protective zone includes 2,170 square miles. Of this total work area, 55 percent is in New Jersey, 34 percent in New York, and 11 percent in Connecticut.

Collected twig samples are delivered daily to the laboratory of the Division of Forest Pathology of the Bureau of Plant Industry at Morristown, N. J. Here the specimens are cultured and positive or negative reports rendered. In New Jersey and New York during the past summer positive reports were then turned over to State officials for prompt eradication of the infected trees. Police powers granted under State Plant Pest Acts are authority for such disease eradication. Practically without exception, property owners concerned have voluntarily granted permission for removal of their infected trees after certain educational preliminaries have brought to their attention the seriousness of the disease. Since State funds were not available for tree removal in Connecticut, the majority of the 57 infected trees found in that State were removed and destroyed by the municipalities concerned.

The most favorable period for determining infected trees is from about June 1 to early in July. As the elms develop their leaves, the wilting characteristic of fungus infection is particularly apparent even at some distance. At this

early period, experienced scouts are able to determine with about 90 percent accuracy the trees exhibiting Graphium infection, despite the fact that the symptoms closely resemble those shown by trees infected with Cephalosporium or Verticillium. As the fungus progressively attacks the tree, further symptoms of the disease appear in the form of browning or yellowing of the foliage, partial defoliation, and, throughout the entire course of the disease, the characteristic discoloration and streaking of the sapwood. Later in summer, other symptoms may mask the disease and the confirmed trees equal only 50 percent of all specimens taken.

At the present time, the most serious aspect of the situation in the known infested zone is the presence of a large number of standing confirmed trees in New Jersey, and the existence in the tri-State area of approximately 60,000 dead and more than half dead elms. Scouts now engaged in elm tree surveys have tagged 31,113 dead and dying elms in New Jersey, 16,243 in New York and 6,589 in Connecticut. A fairly high percentage of these upon culturing are showing Graphium infection. All dead and dying elms are potential breeding places for the bark beetles now indicated as the principal vectors of the disease.

Effective cooperation to the extent possible by appropriated funds has been extended by the three infected states. Gratifying response to the Department's request for cooperation in speeding the eradication program also have been received from the general public, municipalities concerned, and various local organizations interested in civic welfare.

A comprehensive program for next year's scouting activities must also include observations for infected trees in widespread sections of the United States to which have been shipped elm burl logs for veneer manufacturing. With a single exception, infection centers thus far discovered are in the vicinity of veneer

factories known to have received elm burl logs of European origin or are near ports or cities at which infected logs may have been imported or through which they were shipped. Continued intensive scouting must also be performed in the present work area and contiguous sections for the purpose of discovering and eradicating elms infected during the past summer, whose diseased condition will not be apparent until foliage develops next spring.

Until discovery in June 1933 of the disease in the environs of New York City, the known infections appeared to be localized cases which yielded to prompt eradication. When the intensity of the disease was determined in the tri-State area, the Department immediately brought to public attention the scope and seriousness of the situation. At a public conference held in Washington on September 15, 1933, the history of the disease in this country was discussed in considerable detail. Through the regular informational channels of the Department, publicity has been given to the situation as developments warranted. Necessarily, previous eradication attempts have been limited by the sums available for the work. Research observations point to the incidence of the disease in this country at least as early as 1929. Despite the five years in which infection has spread, rapid strides have been made in the past nine months in discovering and eradicating elms now diseased. A sustained program involving adequate scouting and eradication over a period of years to ferret out any remnants of the disease will, we believe, result in its ultimate eradication.

Under a recent allotment of \$527,000 from P.W.A. funds, the Bureau is starting a program for the eradication this winter of all known Graphium-infected elms, and in addition the removal of all dead and more than half dead elms found within the infected area and the surrounding protective zone. This work will be

performed by Federal crews. Eradication of all confirmed trees will eliminate a major source from which infection may spread. Further, destruction of the dead and dying trees will limit the next season's systematic scouting in the heavily infected zone to trees recently infected and showing their first disease symptoms. Destruction of the dead and dying trees will also destroy possible sources of the fungus and breeding places for disease-bearing beetles. State officials engaged in Dutch elm disease control are in addition stressing the advisability of pruning spraying and feeding elms to maintain them in healthy condition as well as render them unfavorable breeding places for the known carriers of the disease.

Members of the Massachusetts Moth Superintendents and Tree Wardens Association may be of material assistance in furthering the Dutch elm disease eradication program by forwarding specimens of elm trees suspected of harboring the fungus. A publication describing the symptoms of the disease and the manner in which specimens should be handled is available upon request.

It will also aid in our scouting program if elm trees are sprayed to protect them from stripping by such destructive insects as the elm leaf beetle, cankerworm and gypsy moth. Last summer's scouting program in some instances was delayed as much as a month until refooliation of the elm after severe attacks by the cankerworm and leaf beetle.

Elm sanitation measures that are part of any thorough tree protection program also may be of assistance in furthering the eradication of the disease. While there has not as yet been proven a direct correlation between initial vigor of an elm and its chance of becoming infected or killed by Graphium, approved methods of tree spraying, pruning and feeding to maintain a healthy, vigorous tree should

reduce the opportunities for spread of infection and the possibilities of insect carriers of the disease surviving in dying branches.

